

C. C. Bratten

February 1966

A. E. Res. 192

Letters to Report

AN ECONOMIC STUDY
OF COMMERCIAL DAIRY FARMS
CENTRAL PLAIN REGION, NEW YORK
1963-64

by L. C. Cunningham

Department of Agricultural Economics
Cornell University Agricultural Experiment Station
New York State College of Agriculture
A Contract College of the State University
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INTRODUCTION

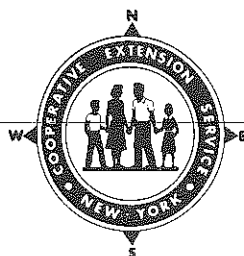
This report consists of a series of letters which present preliminary results of an economic study of commercial dairy farms located in the Central Plain region of New York.

Financial records were obtained by the survey method for 404 farms for the 12-month period ended April 30, 1964. The cross section sample of 209 farms was supplemented by additional samplings of large farms to give a total of 404 farms. There were 2,560 farms of this type in the region.

Eleven letters were included in the series. They were sent to cooperating farmers in the survey and to county agricultural agents, high school teachers of agriculture, college associates, and other interested persons. A final report of the study will be published in bulletin form.

Even in a relatively stable industry like dairying many changes are being made, particularly with respect to size of operation and amount of mechanization. The series of letters made it possible to report some results of the study more promptly than the conventional printed bulletin method. Another worthwhile advantage of the procedure was the stimulation of ideas about analysis of the data during the progress of the study.

The Central Plain region is one of five major regions in New York in which such study has been made. A similar study of this region was made 10 years earlier.



New York State Cooperative Extension Service

Department of Agricultural Economics
Letter Number 1

Cornell University, Ithaca, New York
December 1, 1964

DAIRY FARMING IN THE CENTRAL PLAIN REGION

To Farmers Visited on
Farm Management Survey:

Your farm was one of some 400 farms visited last summer in the farm management survey of the Central plain dairy region. This letter is the first of a series to report results of the study as they become available. The letters, intended to show our appreciation for your cooperation, will cover a wide range of topics. These include crops, milk production, labor force, power and machinery, investment, income, and factor-income relationships.

Central Plain. One of 5 major dairy regions of New York State, this region embraces the medium and high lime soils in the western part of the state. It extends from Erie and Niagara Counties on the west to Onondaga County on the east. Parts of 14 counties are included (see map on back of this letter). About 2,600 commercial dairy farms and 1,000 part-time dairy farms, 10 percent of the state's total, are located in the region.

This project covering 1963-64 is a repeat of a study made for 1953-54 of the Central Plain. R. C. Wells, graduate student, is assisting with the present study.

Purposes. These are:

- a) To describe the physical and financial characteristics of the commercial dairy farms and their environment.
- b) To show changes from 1953-54 to 1963-64.

- c) To provide guidelines for the future.

Sampling. For the 1953-54 study, locations of the farms of the region were spotted on detailed maps. The roads were divided into pieces or segments containing 6 farms each. A random sample of 150 segments was used in the original study. These segments were revisited in 1964 and counts were made of the places and records were obtained for the commercial dairy farms.

For the present study, all farms selling milk as of May 1963 were located, and the roads were segmented. In addition to the 150 original segments, farms in other randomly drawn segments were enumerated to increase the numbers of large farms needed for analysis.

One-third fewer farms. Counts made of places in the 150 road segments in 1954 and again in 1964 show considerable shift in farming units. About half of the commercial dairy farms in operation in 1954 had dropped out of such operation by 1964. Some new operations had started up, however, during the 10-year period. Consequently, there were about two-thirds as many commercial dairy farms in 1964 as in 1954:

Items	Number	Percent
Farms, May 1954	417	100
Farms dropped out	196	47
Former farms left	221	53
New farms	51	12
Farms, May 1964	272	65

Dropouts. More than half of the commercial dairy farms that dropped out of dairying between 1954 and 1964 became rural residences. About one-fourth continued in commercial farming other than dairy. Fifteen percent of them shifted to part-time non-dairy farming, but only 3 percent were in dairy farming on a part-time basis. The land on these 'dropout' farms probably was used by continuing farm units, since land abandonment is practically nil in this region.

Changes in herd size. Changes in the distribution of commercial dairy farms by size of herd between 1954 and 1964 were indeed striking. Compared with 10 years earlier, there were markedly fewer small herds and more large herds. The proportion of farms in the group with 6 to 19 cows dropped from 48 percent to 17 percent. A significant shift was to herds in the 40 to 59 cow range, although still larger herds also increased in proportion:

Cows per farm	<u>Percent of farms</u>	
	1954	1964
6 to 19	48	17
20 to 39	44	51
40 to 59	6	22
60 to 99	1	7
100 or more	<u>1</u>	<u>3</u>
Total	100	100

Number of records. As a result of re-surveying the remaining dairy farms in the original study and adding some large farms to the sample, the following numbers of records by size of herd were collected for 1963-64:

Cows per farm	Number of records
6 to 19	31
20 to 39	119
40 to 59	149
60 to 99	80
100 or more	<u>31</u>
Total	410

The rate of sampling was just under 10 percent for the 2 groups of smallest size of herds, about 25 percent for the group of 40 to 59 cows and 40 and 45 percent in the larger size of herd groups, respectively.

To describe the region, the data from these records are weighted, not by the number of records, but by the percentage distribution of farms by size of herd groups presented in the preceding section.

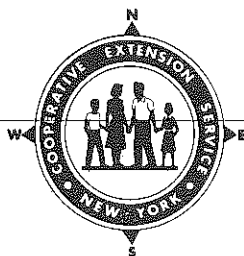
Some important shifts in crop production have taken place in the region during the decade 1954 to 1964. These are described in our next letter.

Yours truly,

L. C. Cunningham

L. C. Cunningham
Extension Economist

P.S: If your name or address is not correct, please let us know. Also if you would like this letter sent to individual partners or other interested persons, send the names and addresses.



New York State Cooperative Extension Service

Department of Agricultural Economics
Letter Number 2

Cornell University, Ithaca, New York
January 6, 1965 3

DAIRY FARMING IN THE CENTRAL PLAIN REGION

Crop Production

To Farmers Visited on
Farm Management Survey:

Your competitive position in dairying is determined in an important way by the success of crop and pasture programs to feed the dairy herd. The results of our study provide some bench marks and guides by which you can judge your own program. In this discussion, keep in mind the crop figures are for 1963 with a growing-season rainfall somewhat below average and killing frosts in September but otherwise about normal.

Use of land. The average size of the commercial dairy farms in the region was about 260 acres per farm, of which some 160 acres were cropped. Cropland as defined for this study means the acreage harvested by man. Tillable land pastured for the season, even though cropped in previous years, is excluded from cropland acreage and included in pasture acreage. The amount of land used for pasture was surprisingly small, only 27 acres per farm and emphasizes the shift in the region to bringing feed to the cows:

Land use	Acres per farm
Crops	163
Pasture	27
Woods	51
Farmstead and other	22
Total	263

Total acreage ranged from 134 acres per farm with herds of 6 to 19 cows to nearly 750 acres with herds of 100 or more cows. Renting of additional land was widely practiced,

especially by operators with large herds. All of the land operated as one unit, whether or not it was owned, is included as one farm.

From 1953 to 1963, the total acreage operated per farm increased from 218 to 263 acres. The expansion was mostly in cropland; pasture acreage was cut in half, but the acreage of woods increased.

Use of cropland. Feed crops for dairy cattle compete strongly with cash crops for cropland on commercial dairy farms in this region, with feed crops having the edge.

The common feed crops (hay, corn and oats) occupied nearly 75 percent of the cropland. Hayland acreage averaged 65 acres per farm, nearly 40 percent of all cropland. Most of the hayland was harvested for hay, but about one acre in 10 was harvested either as grass silage or greenchop.

Corn for silage or grain was raised on 22 percent of the crop acreage, with silage acreage somewhat larger than grain.

Fifteen percent of the cropland was in oats, practically all of which was harvested for grain. Wheat used 12 percent and dry beans 3 percent of the crop acreage.

Vegetables and miscellaneous crops accounted for 4 percent and the Soil Bank for 5 percent of the total crop acreage.

Shifts in the relative importance of different crops in the region from 1953 to 1963 are significant. The proportion of the crop acreage in hayland rose from 32 percent to 39 percent. Hayland harvested as grass silage was unchanged in importance - 2 percent of the cropland in both years, but greenchop came into practice in a significant way.

Corn for silage increased in relative importance from 8 percent of the crop area to 12 percent, but corn for grain was unchanged - 10 percent in both years.

Wheat, dry beans and vegetable crops declined in importance, thus releasing land for expansion of hay and corn for silage, as well as for cropland in the Soil Bank:

Crop	Percent of total cropland	
	1953	1963
Hayland	32	39
Corn, silage	8	12
Corn, grain	10	10
Wheat	21	12
Oats	16	15
Dry beans	6	3
Vegetables	5	2
Soil bank	0	5
Other	2	2
Total	100	100

Percentage of farms raising selected crops. Practically all of the dairy farms harvested hay in both 1953 and 1963, but the proportion of the farms that put up grass silage declined from 18 percent to 12 percent. The new practice of making haylage was reported by only one percent of the farms for 1963.

Most dairy farms produced corn in both years. In 1963 compared with 1953, however, an even higher proportion raised corn for silage and a

somewhat smaller percentage husked corn for grain.

Wheat was less commonly raised in 1963 than 10 years earlier, but the proportion of farms having oats and barley rose slightly. The percentage of farms raising dry beans was nearly halved; this was also true of the less important cash crops - cabbage, sweet corn and peas:

Crop	Percent of farms	
	1953	1963
Hay	99	99
Haylage	0	1
Grass silage	18	12
Corn, silage	85	91
Corn, grain	89	85
Wheat	93	76
Oats	90	94
Barley	8	10
Dry beans	41	22
Cabbage	9	4
Sweet corn, c.f.	10	4
Peas, c.f.	8	2

Here, of course, we are considering crops raised on commercial dairy farms. Generally speaking, the shift in this type of farming is toward more farms producing roughage crops and fewer of them raising grain and vegetable crops for sale. Other farms in the region specialize in some of these cash crops.

There was little or no relationship between size of herd and proportion of farms raising feed and cash crops. Contrary to what might be expected, the proportion of farms raising cash crops was just as high among farms with large herds as among those with medium size or small herds.

Average yields of major crops. The calculation of hay yield per acre is complicated by variation in number of cuttings, making of grass silage and by green chopping. On the basis of dry weight of all hay, grass silage

and greenchop harvested, the average yield was 2.7 tons per acre - 42 percent above state average. By number of cuttings, yields ranged from 2.0 tons per acre to 3.2 tons:

Number of cuttings	Tons per acre
One	2.0
Two	2.7
Three	3.2

Corn silage yields averaged 11.4 tons per acre - 5 percent below state average, but the corn grain yield of 66 bushels per acre was 14 percent above. Small grain and dry bean yields averaged well above those for the state as a whole:

Crop	Amount per acre	% above or below state average
Hay	2.7t.	+42
Corn silage	11.4t.	-5
Corn grain	66 bu.	+14
Oats	65 bu.	+23
Wheat	40 bu.	+11
Barley	51 bu.	+38
Dry beans	23 bu.	+15

Compared with 10 years earlier, 1963 crop yields in the region were about the same for hay, corn for silage and dry beans and higher for wheat, oats and corn for grain.

Cropland and cows. The averages for the region were 163 acres of crops and 37 cows per farm. Thus the rate of stocking was 4.4 crop acres per milk cow and accompanying stock, of which 2.4 acres were roughage crops. The rate varied from farm to farm and was related to herd size.

Farms with small herds operated more cropland in relation to the number of cows, while farms with the largest herds were stocked the heav-

iest, particularly with respect to roughage crop acreage:

Cows per farm	Acres per cow	
	All crops	Roughage
6 to 19	5.4	2.4
20 to 39	4.4	2.4
40 to 59	4.4	2.4
60 to 99	4.2	2.3
100 or more	3.7	2.0

What is your situation with respect to cropland and cows? To calculate it as we did, divide the total acres of crops you harvested in 1964 by the estimated number of milk cows in your herd during the past crop season and the current winter. As we get along with the study, we expect to determine an optimum figure for the region.

Roughage per farm and per cow. The major sources of roughage were hay, 158 tons per farm, and corn silage, 229 tons of actual weight or 76 tons of hay equivalent per farm (3 tons of silage or 5 tons of greenchopped feed equal 1 ton of hay). Most of the hayland was harvested as hay. The balance was harvested as haylage, grass silage and greenchop. On a hay equivalent basis, these accounted for 22 tons per farm. Other silages were not important, but greenchop material other than from hayland (mostly corn) was of some importance:

Crop	Tons per farm	
	Actual	Hay equiv.
Hay	158	158
Haylage	12	6
Grass silage	15	5
Greenchop, hayld.	53	11
Corn silage	229	76
Silages, other	2	1
Greenchop, other	19	4
Total	x x	261

All harvested roughage crops amounted to 261 tons of hay equiv-

alent per farm, or 7.0 tons per milk cow. This figure includes the roughage for the accompanying stock as well as the milk cows. Not all of it was consumed by the animals, however, because of storage losses and waste. Also, hay was sold or carried over in some cases.

The 7.0 tons of roughage harvested per cow in 1963 compare with 6.4 tons 10 years earlier. The sales of hay were slightly smaller in the recent year.

Variation in roughage per cow. Because of differences in rates of stocking the cropland, in crop yields and in cropping systems, the amount of roughage put up per cow varied from farm to farm.

Supplies were liberal on some farms. About one-fourth of the farms had 8.0 tons or more per cow. One farm in 10 in this group sold some hay. Roughage was scarcer on other farms - less than 5.0 tons on 18 percent of all farms. Roughage supplies on the remaining farms were in between these extremes:

Tons hay equivalent per cow	Percent of farms
Less than 5.0	18
5.0 to 5.9	24
6.0 to 6.9	15
7.0 to 7.9	16
8.0 or more	27

Size of herd and roughage per cow. Of particular interest is the amount of roughage per cow on farms with different sizes of herd. Except for the farms with 100 or more cows, the larger the herd, on the average, the larger the amount of hay equivalent harvested per cow:

Cows per farm	Tons hay equiv.per cow
6 to 19	6.1
20 to 39	6.7
40 to 59	7.2
60 to 99	8.0
100 or more	7.1

One reason for this relationship is that the operators of the larger herds depended on more feeding out of storage and green chopping and less on pasture than in the case of small herds. The farms with 100 or more cows had somewhat less roughage per cow than those in the intermediate size groups because they had a smaller amount of cropland per cow. Their hay and corn silage yields per acre were as high or higher.

Dates of hay harvest. Quality is important, of course, along with quantity of roughage. Date of harvest of the first cutting of hay - one evidence of feeding value - was enumerated for each farm. Dairymen in this region get an early start in haying - 80 percent of them were started by mid-June. In fact, 45 percent were half done by that date. The larger the herd, the higher the percentage of operators started by mid-June.

To complete first cutting hay by the end of June is a common goal. This was accomplished on more than one-half of the farms:

Date of first cutting hay	Percent of farms
Started by June 15	80
Half done by June 15	45
Completed by June 30	57

Although a higher proportion of operators with large herds started early than those with small herds, the percentage who had completed the job by the end of June was no higher.

Roughage production for 1965? You can calculate your prospective supplies, using planned acreages for the coming season and your usual yields. See the form on the bottom of this sheet. Will the hay equivalent for your farm be above the regional average - 7.0 tons per milk cow? This is an objective test of your crop program. Results of this study of

groups of farms provide bench marks by which to judge your own situation. The relationship between roughage and milk production will be discussed in a future letter.

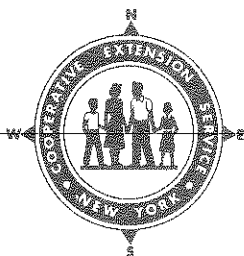
Yours truly,

L. C. Cunningham

L. C. Cunningham
Extension Economist

CALCULATION OF TONNAGE
OF HAY EQUIVALENT TO BE PRODUCED
on your farm, 1965

Crop	Acres	Usual yield per acre	Tons to harvest	
			Actual	Hay equivalent
Hay, 1st cutting	_____	_____)		
2nd cutting	_____	_____)	_____ ÷ 1	_____
3rd cutting	_____	_____)		
Grass silage	_____	_____	_____ ÷ 3	_____
Corn silage	_____	_____	_____ ÷ 3	_____
Greenchop	_____	_____	_____ ÷ 5	_____
Other roughage	_____	_____	_____	_____
Total amount		X X	X X	=====
Number of cows				=====
Amount per cow				=====



New York State Cooperative Extension Service

Department of Agricultural Economics
Letter Number 3

Cornell University, Ithaca, New York
March 10, 1965

DAIRY FARMING IN THE CENTRAL PLAIN REGION

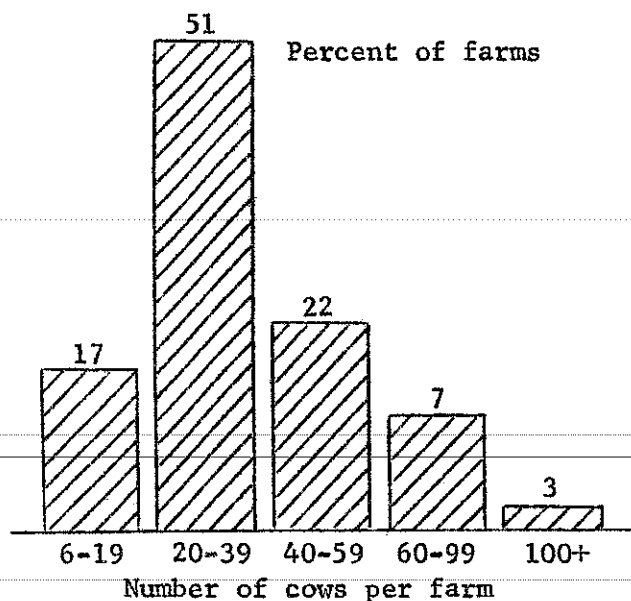
Milk Production

To Farmers Visited on Farm Management Survey:

How are the commercial dairy farms organized in the Central Plain region? How large? What level of milk production per cow? How much milk sold? Equally important, what changes have occurred in 10 years? Our survey last summer and comparisons with a similar study made 10 years earlier provide answers to these and other questions.

Number of cows. The dairy herds averaged 37 milk cows per farm. All of the milk cows under one management are counted as one herd, even though cows are milked in more than one barn. Part-time farms are not included in the study.

Although the average was 37 cows, there was a wide range from farm to farm in size of herd:



Small herds (6 to 19 cows) accounted for 17 percent of the total. A range of 20 to 39 cows per farm included about 50 percent of all farms, and 40 to 59 cows 22 percent. In the upper range of the scale, 7 percent of the herds had 60 to 99 cows and 3 percent had 100 or more cows. The largest herd had 228 cows.

From 1953-54 to 1963-64 in this region, the average number of milk cows per farm increased from 22 to 37, or 15 cows. In the state as a whole the increase was 9 cows. The combining of farms into larger units and the dropping out of dairying of small herds have been more rapid in this region than in the whole state.

The change in the proportion of small herds was surprisingly large. In the early period, nearly half of the herds were in the range of 6 to 19 cows. But a decade later this figure had dropped to 17 percent. Herds of 20 to 39 cows showed a moderate relative increase and those of 40 to 59 cows rose sharply. Here is the percentage distribution in each year for all size groups:

Cows per farm	Percent of farms	
	1953-54	1963-64
6 to 19	48	17
20 to 39	44	51
40 to 59	6	22
60 to 99	1	7
100 or more	1	3
Total	100	100

Herd replacements. Heifers were raised on practically all of the farms and in sufficient numbers to provide the required herd replacements. There were 26 heifers of all ages per farm, or 6.6 head per 10 cows at the end of the year. This is a smaller number of heifers in relation to the number of cows than a decade earlier, but still above the state average.

The ratio of heifers to cows was similar in all size-of-herd groups, except the smallest-herd group where heifer-raising was less important.

Herd turnover. Herd replacements consisted of 8.8 heifers freshened and 2.6 cows bought for a total of 11.4 additions per farm. Thus about 75 percent of all replacements were home-raised. The proportion of replacements home-raised was highest (84 percent) in the group with 40 to 59 cows. It was lower (68 percent) in the herds of 100 or more cows, probably because of rapid expansion of some of the herds.

The number of cows disposed of during the year averaged 9.8 head per farm. This is equal to 27 percent of the number of cows on hand at the beginning of the year. Ten years earlier, the "culling" rate was 23 percent.

The average rate of disposing of cows was similar in herds of different size except those of 100 or more cows. In this group 33 percent of the cows were disposed of during the year:

Cows per farm	Percent of cows disposed of
6 to 19	27
20 to 39	26
40 to 59	26
60 to 99	29
100 or more	33

Housing of cattle. Ninety percent of the milking herds were housed in conventional stall barns, but the method of housing varied with size of herd. The larger the herd, the more widespread the

use of loose housing for milk cows. Loose housing entirely or in combination with stall barns was used for 13 percent of the 40 to 59 cow farms, 36 percent of the 60 to 99 cow farms and 52 percent of the 100 or more cow farms. Only 5 farms in the entire sample had stall barns with milking parlors.

The adoption of loose housing has been much more rapid in this region than in others of the state. Among the major reasons are: 1) more grain raised and hence more bedding, 2) less commitment in substantial, conventional stall barns, and 3) some farmers are new to dairying and so are perhaps freer to choose the newer system.

Milk production. The total amount of milk sold averaged 390,000 pounds per farm, 10,240 pounds per cow. Milk deliveries for each farm were converted from actual to 3.7 percent butterfat test. The state average during the period of this study was equivalent to 8,570 pounds sold per cow. Thus the region figure is nearly 20 percent higher than that benchmark.

The amount of milk sold per cow varied widely among farms. Sales of less than 6,000 pounds per cow occurred on 6 percent of the farms and sales ranging from 6,000 pounds up to 8,000 pounds per cow were found on another 11 percent of the farms. Intermingled with these farms were others with good records. Nearly one-third had milk sales within the range of 10,000 pounds up to 12,000 pounds, another 22 percent were in the range of 12,000 up to 14,000 pounds and 3 percent of the farms had sales of 14,000 pounds or higher:

Pounds of milk sold per cow	Percent of farms
Less than 6,000	6
6,000 to 7,999	11
8,000 to 9,999	26
10,000 to 11,999	32
12,000 to 13,999	22
14,000 or more	3
Total	100

The average amount of milk sold per cow was similar among the various size-of-herd groups, but it was lowest in the 6 to 19 cow group and highest in the 60 to 99 cow group:

Cows per farm	Pounds of milk sold per cow
6 to 19	9,160
20 to 39	10,230
40 to 59	10,760
60 to 99	11,140
100 or more	10,580

Where does your farm rank in relation to these averages? To obtain the comparable figure, total the poundage

from the milk slips for a year and divide by the 12 month's average number of milk cows in your herd:

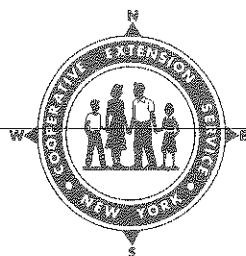
12-month period	Your farm
Total pounds of milk sold	_____
Number of cows	_____
Pounds of milk per cow	_____

Factors related to milk production per cow, including amount of roughage harvested and feed bought, will be discussed in a future letter.

Yours truly,

L. C. Cunningham

L. C. Cunningham
Extension Economist



New York State Cooperative Extension Service

Department of Agricultural Economics

Cornell University, Ithaca, New York

Letter Number 4

March 18, 1965

11

DAIRY FARMING IN THE CENTRAL PLAIN REGION

Farm Labor Force

To Farmers Visited on
Farm Management Survey:

Farm Number 175 in the Central Plain is operated by 2 full-time partners, one hired man for 6 months and a few days of other labor. The labor force, amounting to a man equivalent of 2.6, runs 336 acres of crops and a herd of 45 milk cows and 52 heifers of all ages. The dairy is being expanded. Ten years earlier on this farm, the man equivalent was 2.2 and the milking herd had 20 cows. Let us examine the labor force--operator, family and hired labor--on all the dairy farms surveyed in the region.

Operator labor. The study is based on full-time farm operators. If some work was done by operators off the farm, the income was included in receipts. But if outside income exceeded 25 percent of gross receipts, the farm was classified as part-time and not included in the study.

Partnerships were used on 17 percent of the farms--a small increase from 10 years earlier. Only the businesses with full-time partners were counted as partnerships. In most cases, the partners were sons, brothers or other relatives of the operators. As would be expected, partnerships were much more common on the farms with large herds. In fact, among farms with 60 or more cows, nearly 40 percent were operated as partnerships.

Operators of large farms averaged 5 years younger than those of the typical-size group (20 to 39 cows), but operators of small farms were much the oldest of all:

Cows per farm	Percent of farms with partnerships	Average age of operators
6 to 19	7	57
20 to 39	14	48
40 to 59	23	44
60 to 99	38	43
100 or more	38	43

Family labor. Farm work by members of the family not paid cash wages was expressed in terms of months equivalent of man time. Such family labor amounted to 2.5 months per farm, on the average, and was found on 45 percent of all farms. No change was shown in the amount of family labor per farm from 10 years earlier. The value of this labor was included in farm expenses at a wage allowance of \$175 per month.

Family labor ranged from 1.6 months per farm on small farms to about 3.5 months on farms with 100 or more cows. Nearly half of the farms in each size-of-herd group had some family labor:

Cows per farm	Months of family labor per farm	Percent of farms with family labor
6 to 19	1.6	43
20 to 39	2.5	45
40 to 59	3.0	47
60 to 99	2.7	47
100 or more	3.4	38

Hired labor. Labor hired by the week or month without board was more common than hired help boarded. Hired labor with board averaged 2.3 months per farm and

was reported on about a fourth of the farms. Hired labor without board amounted to 3.9 months per farm and was found on about half of the farms. About one month equivalent of day and hour help per farm was employed. Thus, the hired labor amounted to 7.4 months per farm, compared to 6.5 months per farm in 1953-54.

The larger the herd, of course, the larger the hired labor force. The group of typical-size farms (20 to 39 cows) had about 5 months of hired labor per farm, whereas the farms with 100 or more cows employed 37 months. Most all of the hired help on these large farms was not boarded:

Cows per farm	Months per farm		Total all hired
	By week or month with board	without board	
6 to 19	0.7	0	1.2
20 to 39	2.1	1.7	4.8
40 to 59	3.5	5.6	10.5
60 to 99	2.9	12.4	18.5
100 or more	3.1	31.4	37.1

The proportion of farms having regular hired labor was, of course, higher with large herds than with small herds. Having a hired hand in the farm home is even less acceptable than formerly. The tendency was for the small-herd operators to board the hired men and for the large herd operators not to do so. Hired labor of one type or the other was found on 45 percent of the 20 to 39 cow farms, but on all of the farms with 100 or more cows:

Cows per farm	Percent of farms		
	with regular with board	hired labor without board	either or both
6 to 19	7	0	7
20 to 39	28	21	45
40 to 59	37	45	72
60 to 99	31	75	85
100 or more	41	90	100

Wage rates. Help hired by the week or month and boarded was paid cash wages and bonuses, on the average, of \$135 per month. An additional amount of \$50 per month was included in farm expenses as the estimated cash cost of board. Cash wages and bonuses of hired help not boarded averaged \$198 per month. The value of farm-produced privileges, such as house and milk, was not charged as expenses nor credited to income in this study. Cash privileges such as electricity and fuel were charged in farm expenses, but not in all cases enumerated separately. Average wage rates reported in the 1953-54 study were \$123 and \$184, respectively.

Wage rates rose as size of farm operations increased. Average cash wages and bonuses per month of help boarded ranged from about \$130 on farms with typical-size herds to more than \$200 on 60 to 99 cow farms. The range in wages of help not boarded was from about \$200 to \$300:

Cows per farm	Cash wages per month	
	with board	without board
6 to 19	\$ 45	none hired
20 to 39	131	\$211
40 to 59	183	272
60 to 99	207	301
100 or more	179	239

Man equivalent. All farm labor amounted to 24.2 months per farm, or a man equivalent of 2.0 per farm. No significant change occurred in the size of labor force in the 10-year period:

Workers	Months per farm	
	1953-54	1963-64
Operator	12.0	12.0
Partner	2.1	2.3
Family	2.5	2.5
Hired	6.5	7.4
Total	23.1	24.2
Man equivalent	1.9	2.0

Not only was the size of labor force about unchanged, but the proportions of family and hired labor in the two years were similar. Dairy farming continues to be essentially a family operation.

Average man equivalent per farm ranged from 1.3 on small farms to 3.2 on farms with 60 to 99 cows and 4.9 on farms with 100 or more cows. Only in this latter group of large farms did the amount of hired labor exceed that of operator and family labor:

Cows per farm	Man equivalent per farm	Percent of labor force hired
6 to 19	1.3	8
20 to 39	1.8	23
40 to 59	2.4	37
60 to 99	3.2	48
100 or more	4.9	63

Your labor force. What was the man equivalent for your farm last year? To calculate it, enter the number of full-time months for each worker as follows:

Worker	Months
Operator	_____
Partner	_____
Sons	_____
Other family	_____
Hired	_____
Total	=====
Man equivalent (Total months ÷ 12)	=====

Variation in size of labor force. Within each size-of-herd group of farms, there was some variation in size of labor force. Even with small herds, 6 to 19 cows, more than one-half of the farms had some help besides the operator.

With 20 to 39 cows, the typical labor force was within the range of 1.1 to 2.0 men. Only a few of the farms in this group were strictly one-man operations, and for that matter, not many

had more than 2 men.

Among the farms with larger herds, the size of the labor force varied more widely. About half of the farms with 40 to 59 cows had a labor force of 2.1 to 3.0 men, although a third of them operated with no more than 2.0 men. Likewise, 38 percent of the farms with 60 to 99 cows had 2.1 to 3.0 men, but only 12 percent got along with no more than 2.0 men. A few farms in this group had more than 5.0 men.

The most striking variation in amount of labor employed occurred in the group of farms with 100 or more cows. Typically, these were three to four men operations. However, a few farms had less labor than that and some others had five, six or even more men:

Man equiv.	Number of cows per farm				
	6-19	20-39	40-59	60-99	100+
	Percent of farms				
1.0	36	7	0	0	0
1.1 - 2.0	57	72	33	12	0
2.1 - 3.0	7	17	51	38	14
3.1 - 4.0	0	4	14	32	38
4.1 - 5.0	0	0	2	9	17
5.1 - 6.0	0	0	0	8	10
6.1 +	0	0	0	1	21
Total	100	100	100	100	100

There are several reasons for the wide variation in size of labor force on farms with large herds. First, the size group is open-ended in the upper range. The largest herd in the group had 228 cows and the next largest 221 cows, but no other farms had more than 200 cows. Also, some of the farms were more fully mechanized and some were more highly specialized in milk production than others. Lastly, the kind of labor force played a big part. In some cases, the farms were run by individual operators with hired men of limited abilities. In other cases, the businesses were operated by capable labor forces, frequently young men in partnership--each with a

direct and tangible interest in the results.

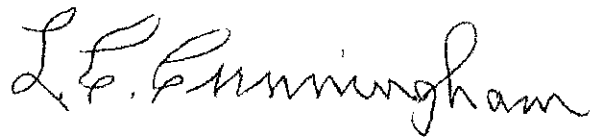
Labor efficiency. On the average, 19 cows and 82 acres of crops were cared for per man. Ten years earlier these figures were 12 cows and 65 acres of crops.

The amount of work accomplished per man was closely related to size of herd. The number of cows per man ranged from only 11 in small herds to 27 in herds of 100 or more cows, averaging 134. Likewise, nearly double the acreage of crops per man was produced on large farms compared with that on small farms:

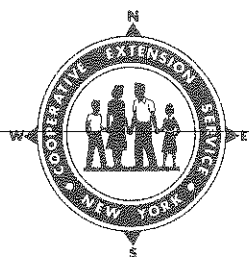
Cows per farm	Cows per man	Crop acres per man
6 to 19	11	55
20 to 39	17	73
40 to 59	20	88
60 to 99	23	100
100 or more	27	100

The use of labor is, of course, directly affected by the amount of power and machinery on the farm. The use of more and more equipment makes it possible to increase the output of the labor force. Our next letter will contain a description of the mechanization on these dairy farms.

Yours truly,



L. C. Cunningham
Extension Economist



New York State Cooperative Extension Service

Department of Agricultural Economics

Cornell University, Ithaca, New York

Letter Number 5

March 30, 1965

15

DAIRY FARMING IN THE CENTRAL PLAIN REGION

Power and Machinery

To Farmers Visited on
Farm Management Survey:

Field operations are almost fully mechanized and farmstead chores are undergoing a rapid change from hand labor to machines, according to findings of the survey of commercial dairy farms in the Central Plain region.

In addition to counts made, inventory values and expenses of operation of all power and machinery on each farm were enumerated.

Power. There were 3.3 tractors per farm, on the average, and the number ranged from 2.2 on 6 to 19 cow farms to 6.4 on farms with 100 or more cows.

The farm share of the expense for electricity averaged nearly \$400 per farm, more than double what it was 10 years earlier. The range was from \$158 per farm on farms with small herds to \$1,245 on large farms.

In addition, the proportion of major harvesting machines which are self-pro-

pelled or have auxiliary motors is increasing. Most farms have plenty of power. Needed are more practical ways to attach and detach tractor-mounted equipment.

Machinery. Essentially all of the farms, except those with small herds, had hay balers. Field choppers also were in common use on larger farms, but were found on only 70 percent of the typical-size farms (20 to 39 cows) and on only a fourth of the small farms.

Mow hay dryers have had some acceptance on larger farms but hay conditioners were in wide usage. On typical-size farms, for example, 73 percent had hay conditioners but only 3 percent had mow dryers. The newer machine, the self-propelled windrower, was found on a third of the farms with 100 or more cows. Either the separate hay conditioner or the integrated conditioner and windrower was used on more than four-fifths of the farms having 40 or more cows:

Cows per farm	Hay bal- er	Field chop- per	Mow dry- er	Hay condi- tioner	S.P. wind- rower	Silo un- loader	Feed bunk augur	Mechanical gutter cleaner*
Percent of farms reporting								
6 to 19	75	25	0	36	0	0	0	7
20 to 39	97	70	3	73	0	14	1	59
40 to 59	99	91	12	82	4	39	6	81
60 to 99	99	96	23	65	17	62	12	83
100 or more	100	97	38	55	34	76	17	95

* Stall-barn farms

Only about 15 percent of the typical-size farms, but 76 percent of the farms of 100 or more cows had mechanical silo unloaders. Seventeen percent of the large farms had feed bunk augurs.

The use of mechanical gutter cleaners was widespread on larger farms. Roughly 4 out of 5 of the stall-barn farms with herds of 40 or more cows had this equipment.

The shift from cans to bulk tanks for handling milk on the farm is well along but not complete. Slightly more than half of the farms have changed over with large farms in the lead. The proportion of farms with bulk tanks ranged from about 20 percent for small herds up to more than 80 percent for farms having 60 or more cows.

The farms with loose housing and parlors have bulk tanks, of course. Among farms having conventional stall barns, most of the farms with larger herds also have gone bulk. On farms with 100 or more cows, round-the-barn milk pipelines and milk transfer stations are about equally common--each method being used on about a fourth of the farms. But on 40 to 99 cow farms, milk transfer stations were used more widely than were milk pipelines:

		Stall-barn farms		
Cows per farm	Bulk milk tanks*	Bulk milk tanks	Milk transfer stations	Milk pipe- line
Percent of farms				
6 to 19	21	19	0	0
20 to 39	48	47	9	0
40 to 59	72	71	25	4
60 to 99	85	79	36	16
<u>100 or more</u>	83	71	24	24
* All farms				

Investment in power and machinery. At current depreciated values, nearly \$16,000 (end of year) per farm was invested in power and machinery. This figure is equal to 20 percent of the

total capital investment of the business. It is \$6,400 or 70 percent larger than 10 years earlier.

Investment ranged from about \$6,000 per farm on small farms and \$13,000 on typical-size farms to nearly \$45,000 on farms with 100 or more cows. Despite the fact that large farms had much more equipment than small ones, the investment was about \$425 per cow in all size-of-herd groups except the group of largest herds. In that group, the investment figure was only about \$330:

Cows per farm	Investment	
	per farm	per cow
6 to 19	\$ 6,140	\$422
20 to 39	13,020	441
40 to 59	20,650	436
60 to 99	30,110	405
100 or more	44,640	332

Expenses for power and machinery. Depreciation, interest on investment and operating expenses for the year amounted to about \$6,500 (net) per farm:

Items	Average farm
Depreciation	\$2,341
Interest on investment	782
Gasoline, oil and grease	951
Repairs	914
Tires, license & insurance	224
Bale ties	153
Milk hauling	509
Machine hire	288
Auto (farm share)	191
Electricity (farm share)	389
Total	\$6,742
Income from custom work	94
Gasoline tax refunds	187
Total (net)	\$6,461

Charges for insurance, housing, and farm labor to make repairs were not included. Credits for income from custom work and gasoline tax refunds were deducted to obtain net total expenses.

Depreciation and interest on invest-

ment were important overhead items and accounted for nearly half of the total. Other comparatively large items were gasoline, oil and grease, and repairs.

Average expenses for power and machinery were \$3,017 per farm in 1953-54 compared with \$6,461 in 1963-64.

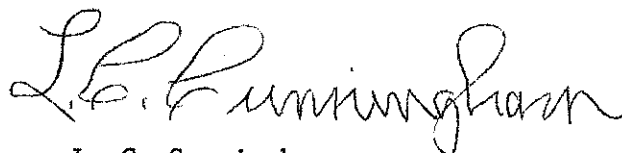
Average power and machinery expenses per farm ranged from \$2,700 for farms with 6 to 19 cows to \$20,000 for farms with 100 or more cows. But on a per-cow basis, the range was from \$187 to \$147, respectively:

Cows per farm	Expenses	
	per farm	per cow
6 to 19	\$ 2,710	\$187
20 to 39	5,380	182
40 to 59	8,180	173
60 to 99	12,350	166
100 or more	19,780	147

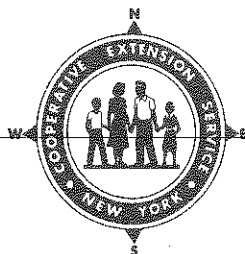
As might be expected from the percentages of farms having different pieces of equipment discussed earlier in this letter, the expenses for power and machinery on a per-cow basis varied widely even within each size-of-herd group.

A future letter will report the relation between use of labor and mechanization and of both to labor income.

Yours truly,



L. C. Cunningham
Extension Economist



New York State Cooperative Extension Service

Department of Agricultural Economics
Letter Number 6

Cornell University, Ithaca, New York
April 5, 1965 18

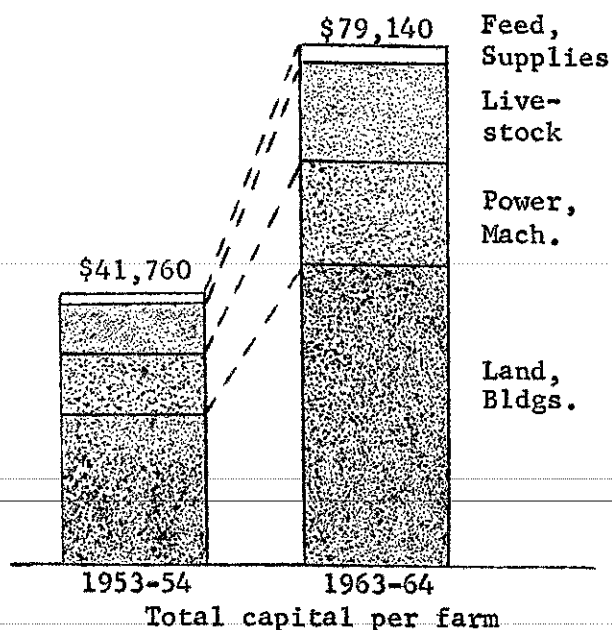
DAIRY FARMING IN THE CENTRAL PLAIN REGION

Capital Investment

To Farmers Visited on
Farm Management Survey:

The amount of money invested in a farm business keeps climbing as the years go by, and the situation in the Central Plain region is no exception. Total capital investment per farm amounted to nearly \$80,000 per farm on the average, just about double the investment figure 10 years earlier. Changes in prices, size of business and mechanization all contributed to the increase.

Renting of land is widely practiced in the region. Only about 40 percent of the farmers owned all of the land they operated. The remainder rented part or all the land they operated, either on a share or cash-rent basis.



In this study, the farms were handled as though they were owner-operated. The value of the rented lands were included in real estate investment. Interest, taxes and other expenses connected with ownership were included in lieu of rent. Small acreages of land rented incidental to the farm operations were, however, included on a rented basis.

Average investment per farm. To the question 'what is the current market value of the land and buildings used in your operations?' the average of farmers' answers was approximately \$47,000 per farm. Ten years earlier the real estate value averaged about \$23,800 per farm. The value per acre increased from \$116 in 1954 to \$176 in 1964.

Nearly \$16,000 worth of power and machinery was on hand, as described in the previous letter. Livestock investment amounted to nearly \$15,000 per farm. Milk cows were valued at \$281 per head, versus \$219 ten years earlier.

The amount of feeds and supplies on hand was at a low level seasonally, the inventory date (April 30) being near the close of the barn feeding period:

Items	Per farm	Percent of total
Land & buildings	\$47,270	59
Power & machinery	15,680	20
Livestock	14,920	19
Feeds & supplies	1,270	2
Total	\$79,140	100

Reported here is the total capital invested in the farm business, whether owned or borrowed. Not included in the investment figures are household goods, non-farm share of auto and outside investments.

Variation in investment per farm. Although modest in amount on some farms, total investment was large on others. Obviously, much of the variation traces to differences in size of herd. With small herds, the total capital averaged only about \$31,000 per farm. On farms with 100 or more cows, however, the average investment approached \$250,000:

Cows per farm	Total investment per farm
6 to 19	\$30,970
20 to 39	63,890
40 to 59	102,350
60 to 99	161,290
100 or more	249,260

Furthermore, variation in investment existed within each size-of-herd group of farms, especially in the large herd groups. Among small herds, practically all of the farms had less than \$50,000 invested. Among medium-size herds, a majority had total capital in the range of \$50,000 and up to \$100,000 and only 9 percent with \$100,000 or more:

Capital per farm (\$ thous.)	Number of cows per farm				
	6-19	20-39	40-59	60-99	100+
	Percent of farms				
0 to 49	96	37	1	0	0
50 to 99	4	54	59	11	0
100 to 149	0	8	30	38	6
150 to 199	0	1	8	33	31
200 to 249	0	0	2	12	28
250 to 299	0	0	0	2	14
300 or more	0	0	0	4	21
Total	100	100	100	100	100

Large herd operations showed considerable difference in capital commitments. A few of those with 100 or more cows had less than \$150,000 total cap-

ital and 31 percent of them had \$150,000 to \$199,000. But 21 percent of the group had \$300,000 or more invested per farm.

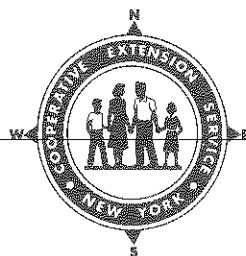
Reasons for this lack of uniformity in investment are numerous. Some variation in number of cows existed, of course, within each range of herd size used. Some dairymen valued their cattle at higher prices per head than others did. Also, differences in physical properties were reflected in the total investment. It was pointed out in the previous letter that not all farms were equally well equipped. Differences from farm to farm in size and condition of buildings are easily observed in the region. Lastly, location with respect to non-farm developments influenced farm real estate values.

Additions to investment. Three categories of investment increased from the beginning to the end of the year. Outlays for new and additions to buildings and for repairs were sufficient to offset depreciation and increase real estate values nearly \$1,400 per farm. Net purchases of power and machinery during the year were just about equal to depreciation, hence little change occurred in the two inventories. Cattle were valued at the same price level at the beginning as at the end of the year, but the number of cows increased somewhat during the 12-month period. Therefore, the livestock inventory rose about \$700. The increase in total investment during the year averaged about \$2,200 per farm, or about 3 percent.

More and more capital is being used to enlarge and mechanize farm operations. What about incomes? This is the subject of the next letter.

Yours truly,

L. C. Cunningham
L. C. Cunningham
Extension Economist



New York State Cooperative Extension Service

Department of Agricultural Economics

Cornell University, Ithaca, New York

Letter Number 7

May 18, 1965

20

DAIRY FARMING IN THE CENTRAL PLAIN REGION

Labor Income

To Farmers Visited on
Farm Management Survey:

The sample of commercial dairy farms in the Central Plain region shows the averages per farm to be 263 total acres (163 acres of crops), 37 milk cows and accompanying stock, and milk sales of 10,240 pounds per cow--all operated by a labor force of 2.0 men. Capital investment amounts to about \$80,000 of which nearly \$16,000 is in power and machinery. What about income?

Farm receipts. Milk sales averaged nearly \$17,000 per farm and accounted for 72 percent of total operating receipts. The average price received for milk, 3.7 percent butterfat basis, was \$4.33 per 100 pounds.

Cattle and other livestock sales were about \$2,500 and crop sales were nearly \$3,000 per farm. Miscellaneous receipts, including ACP and Soil Bank payments, amounted to a little more than \$1,100. Receipts from all sources totalled \$23,567:

Items	Per farm
Milk	\$16,848
Other L.S. products	213
Livestock	2,454
Crops	2,946
Miscellaneous	1,106
Total	\$23,567

The increase in total investment during the year amounted to \$2,248 per farm, as explained in the previous letter. In the financial summary, this inventory increase is added to operating receipts to give total farm receipts.

Farm expenses. Feed purchases averaged nearly \$3,400 per farm, most of which were for supplements and mixed feeds:

Items	Per farm
Feed	\$ 3,356
Mixed feeds	\$3,163
Roughages	193
Power and machinery	\$ 3,618
Repairs	914
Tires, license, insurance	224
Gas, oil, grease	949
Auto (farm share)	191
Milk hauling	509
Machine hire	289
Bale ties	153
Electricity (f.s.)	389
Labor	\$ 2,317
Hired	1,879
Family	438
Real estate	\$ 1,760
Taxes	780
Repairs	513
Insurance	303
Fences & drains	112
Rent	52
Crop	\$ 1,897
Fertilizer	1,198
Lime	123
Seeds & treatment	497
Spray materials	79
Miscellaneous dairy	\$ 696
Supplies	157
Testing	90
Registration fees	17
Breeding fees	179
Veterinary & medicines	253
Livestock	\$ 1,103
Miscellaneous	487
Total	\$15,234

Power and machinery expenses, exclusive of depreciation and interest, amounted to about \$3,600 per farm.

Hired labor expenses were \$1,879 and wage allowances for family labor were \$438 per farm, making a total of \$2,317. Operator labor is not included in the list of expenses. The financial summary is made in terms of operator labor income, as is shown later.

Real estate taxes, repairs and other expenses connected with land and buildings amounted to \$1,760 per farm.

Crop expenses, including fertilizer, lime, seeds, and spray materials, came to nearly \$1,900. Expenses for lime were nominal, but those for fertilizer were about \$1,200. These are total amounts expended; partially offsetting ACP payments are reported in the farm receipts.

Among the miscellaneous dairy expenses were breeding fees of about \$180 and veterinary fees and medicines of \$250 per farm. The group total was just under \$700.

On the average, 2.6 cows per farm were bought at \$272 per head. These purchases accounted for much of the total of \$1,103 for livestock bought.

Several small miscellaneous items came to about \$500. Total operating expenses were approximately \$15,200 per farm.

Net purchases of power and machinery amounted to \$2,299 per farm. Expenditures for new or additions to real estate were \$1,292. Such capital items are not all charged off in one year. In the calculation of net incomes, these outlays are included along with farm expenses. But they are offset, except for depreciation, by increases in end over beginning inventories.

For example, a farmer may trade an

old tractor inventoried at \$1,000 for a new tractor, paying \$4,000 difference. The new tractor is inventoried at the close of the year for \$4,000. The inventory shows an increase of \$3,000. The charge against net income is \$1,000 depreciation.

The combined capital outlays amounted to \$3,591 per farm. This figure is added to operating expenses in the financial summary.

Labor income. Total farm receipts and inventory increase amounted to nearly \$26,000 per farm. Total farm expenses and capital outlays were \$18,800. The difference between these two group totals amounted to about \$7,000. This difference is called farm income. From it interest on total investment at 5 percent, which amounted to \$3,900, was deducted. The remainder, called farm labor income, was \$3,089. Incomes of farms operated as partnerships were reported as labor income per operator. The average labor income per operator was \$2,553:

Items	Per farm
Farm receipts	\$23,567
Inventory increase	2,248
Total	<u>\$25,815</u>
Farm expenses	\$15,234
Capital outlays	3,591
Total	<u>\$18,825</u>
Farm income	\$ 6,990
Interest @ 5 percent	<u>3,901</u>
Farm labor income	<u>\$ 3,089</u>
Labor income per operator	\$ 2,553

Labor income per operator, referred to from here on simply as labor income, is used to measure the financial success of the farm operations. It shows what a farmer makes for his year's work. In addition to his labor income the farmer receives the use of a house and some products for home use. It is one of the

best measures for comparing individual farms or groups of farms--the primary purpose of this study.

If comparisons are to be made between farm and non-farm groups, the value of the living, including use of dwelling, obtained from the farm should be added to labor income.

Neither of these measures necessarily shows the amount of income available for family living and saving. Such income is also affected by the amount of indebtedness and by the non-farm income of the family.

Income comparisons. Comparisons are made of the average labor income of the farms under study with 1) hired men's wages, 2) average income of farms in the same region surveyed 10 years earlier, 3) incomes of farm account cooperators and 4) incomes of dairy farmers in other regions of the state.

Average hired men's wages per month with house in this region were reported in letter number 4 to be \$198 per month. The average labor income of the dairy farmers of \$2,553, or \$213 per month, is not significantly larger than hired men's wages. Over a period of years in New York farming, average incomes of farmers have about equalled hired men's wages, although wide differences have existed in some years.

Ten years earlier, 1953-54, the average labor income of the dairy farms surveyed was \$3,135 compared with the \$2,553 for 1963-64. The lower income is somewhat surprising in light of the changes that have been made on the farms. Average prices received for milk and grains were somewhat lower, but most farm costs were higher. Even more important, perhaps, is the fact that since the capital investment had nearly doubled, the interest charge per farm jumped from \$2,019 to \$3,901.

For a selected group of 468 dairy farms located in 28 counties widely distributed over New York State, those in the extension service farm business management projects, the average labor income was \$3,492 for 1963 compared with the \$2,553 for the random sample of farms reported in this study.

Another comparison of interest is with incomes of commercial dairy farms in other regions of the state. The studies of all regions are based on random samples of farms, but are for different years. The crop seasons were about normal and economic conditions were similar, except that crop prices were comparatively high in 1953-54 and milk prices were weak in 1955-56. Also milk prices have declined since 1959. Prices paid by New York dairy farmers rose persistently during the entire period at an average annual rate of nearly 2 percent.

Labor incomes in the Central Plain region for 1963-64 averaged about \$600 higher than in the Hudson Valley for 1961-62 and in the Oneida-Mohawk for 1959-60, and about the same as on valley farms in the Plateau region for 1957-58. They were considerably higher than in the North Country and for hill farms in the Plateau region:

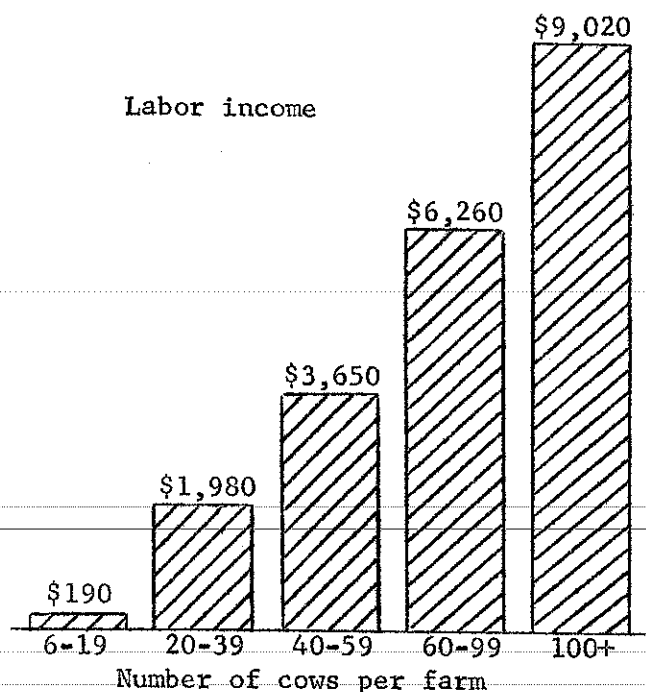
Region	Year	Labor income
Central Plain	1963-64	\$2,550
Hudson Valley	1961-62	1,950
Oneida-Mohawk	1959-60	1,950
Plateau		
Hill	1957-58	1,700
Valley	1957-58	2,660
North Country	1955-56	890

Differences in land resources and market conditions as they are reflected in how the farms are organized and operated, together with some changes in prices, largely account for the differences in level of incomes between regions.

Variation in incomes. Individual farm incomes varied widely around the average of \$2,553, as might be expected from the description of the farms. Much of this variability was associated with size of herd. Operators with small herds fared poorly, on the average, whereas those with large herds were remarkably successful.

Total receipts were sufficiently large to cover farm expenses and interest on investment but left only \$190 to pay the farmer for his labor, as an average for the group of farms with 6 to 19 cows. Such a low level of income is forcing many operators in this situation to seek off-farm jobs or to retire from active farming. In the group of farms with 20 to 39 cows, labor incomes averaged nearly \$2,000 and in the group with 40 to 59 cows, \$3,650.

Higher average incomes were made in the larger herd groups. The 60 to 99 cow farms made \$6,260. The largest farms, those with 100 or more cows, were the most profitable; their average labor income was about \$9,000:



Thus, size of herd explains some of the variability in labor incomes, but incomes varied significantly within each size-of-herd group. In the group of smallest herds, 43 percent of the farms failed to make a plus labor income, although losses were small on most of them. The remainder of the small farms made plus labor incomes. The highest individual labor income in the group was \$3,435. As size of herd increased, the proportion of farms with losses tended to decrease and the proportion with incomes of at least \$10,000 to increase:

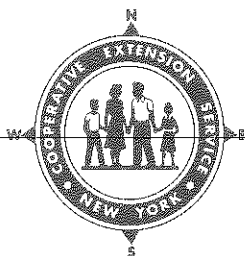
Range in labor income	Number of cows per farm				
	6-19	20-39	40-59	60-99	100+
	Percent of farms				
Below -\$5,000	--	4	4	4	--
-5,000 to -1	43	18	14	15	7
0 to 4,999	57	62	45	28	31
5,000 to 9,999	--	14	29	27	24
10,000 to 14,999	--	1	5	18	21
15,000 to 19,999	--	1	3	4	7
20,000 or more	--	--	--	4	10
Total	100	100	100	100	100

In the typical-size group, 20 to 39 cows, 62 percent of the farms were in the 0 to \$4,999 income bracket; 22 percent of them incurred losses, but only 2 percent made \$10,000 or more. Likewise, in the groups with 40 to 59 cows and 60 to 99 cows, incomes were scattered over a wide range. The proportions of farms with losses were lower than in the smaller herd groups, but the losses were greater in some cases. Incomes in the higher brackets were more common. Among the farms with 100 or more cows, only 7 percent suffered losses and 38 percent earned \$10,000 or more. In fact 10 percent of the large farms made more than \$20,000.

Reasons why some farms were so much more profitable than others will be discussed in future letters.

Yours truly,

L. C. Cunningham
L. C. Cunningham
Extension Economist



New York State Cooperative Extension Service

Department of Agricultural Economics
Letter Number 8

Cornell University, Ithaca, New York
July 21, 1965 24

DAIRY FARMING IN THE CENTRAL PLAIN REGION

Crop Yields

To Farmers Visited on
Farm Management Survey:

The variation in labor incomes within size of herd groups of farms reported in letter number 7 is largely accounted for by differences in per-acre yields of crops, in rates of milk production per cow, in use of labor and machinery, and in degree of specialization in milk production on the farms in the Central Plain region. These farm management factors in their relationship to labor income will be analyzed and reported in ensuing letters. Crop yields are discussed in this letter.

To minimize the effect of size of herd in the analysis of factor-income relationships, 3 size of herd groups are generally used: 1) the 118 farms with 20 to 39 cows, 2) the 148 farms with 40 to 59 cows, and 3) the 95 farms with 60 to 119 cows.

Crop Yields

Crop yields affect labor incomes of dairy farms in this region in 2 ways. In a given size of herd, yields influence the amount of feed for the cattle and hence the rate of milk production per cow. Yields also affect crop sales.

Crop yield index. A crop yield index was calculated for each farm. The per-acre yields of the major crops for a particular farm are expressed as a percentage of the average yields for the region. For example, a crop yield index of 140 for a farm means that the combined yields of the crops were 40 percent above the regional average.

Relation to roughage per cow. Crop yields were closely related to the amount of roughage harvested per cow in all 3 size of herd groups. For example, in the group of farms with 60 to 119 cows, as the crop yield index rose from less than 85 percent to 115 percent or more, the average amount of roughage went up from 6.2 tons per cow to 8.7 tons. Similar increases were found in the other size of herd groups:

Crop yield index	20-39 cow farms	40-59 cow farms	60-119 cow farms
Tons H.E. harvested per cow			
Less than 85	5.7	6.1	6.2
85 to 99	6.6	7.0	7.3
100 to 114	6.6	7.2	7.5
115 or more	8.0	8.0	8.7

Relation to milk per cow. As crop yields improved, the amount of milk per cow increased generally in the 3 size of herd groups:

Crop yield index	20-39 cow farms	40-59 cow farms	60-119 cow farms
Pounds milk sold per cow			
Less than 85	9,430	10,220	9,790
85 to 99	10,200	10,900	10,570
100 to 114	10,930	10,310	10,800
115 or more	10,240	11,360	11,780

One exception was in the 20 to 39 cow group of farms. With the highest level of crop yields, milk per cow failed

to rise, largely because the amount of feed bought per cow dropped. The opposite occurred, however, in the 60 to 119 cow group of farms. With the highest level of yields, the amount of feed bought per cow went up, giving an added boost to the amount of milk per cow. Thus, the difference of high over low crop yields in this region meant about 2 tons more hay equivalent and at least 1,000 pounds more milk per cow.

Relation to crop sales. In each size of herd group of farms, crop sales showed marked responses to increasing crop yields. For example, the 40 to 59 cow farms with low crop yields (less than 85 percent) had average crop sales of only about \$1,300 per farm. But the farms in this same size of herd group with high yields (115 percent or higher) had crop sales in excess of \$5,000 per farm. Although somewhat less consistent, the same relationship held in the other 2 size of herd groups of farms:

Crop yield index	20-39 cow farms	40-59 cow farms	60-119 cow farms
Crop sales per farm			
Less than 85	\$ 710	\$1,280	\$4,550
85 to 99	1,780	3,720	4,200
100 to 114	3,240	4,470	8,710
115 or more	2,340	5,080	9,610

Thus, high crop yields compared with low yields produced not only more roughage per cow but also something like \$75 more crop sales per cow.

Relation to labor income. As crop yields went up, the amount of roughage per cow, milk per cow, and crop sales were all shown to increase. The additive effects of yields on labor income are almost self-evident. High yields were more profitable, on the average, than were low yields in all 3 size of herd groups of farms. And, of course, the larger the herd, the greater the leverage of this yield factor on income:

* HL Honeoye-Lima; Od Ontario, drumlin areas; OH Ontario-Hilton; LC Lansing-Conesus; CO Cazenovia-Ovid; P Palmyra; OS Odessa-Schoharie.

Crop yield index	20-39 cow farms	40-59 cow farms	60-119 cow farms
Labor income			
Less than 85	\$ 800	\$1,190	\$3,170
85 to 99	1,730	3,220	3,540
100 to 114	3,220	3,210	6,630
115 or more	2,060	5,630	8,740

Only in the one sub-group of small farms with high yields did the income response fall short and this traces back to the low amount of milk per cow mentioned earlier.

Soils Related to Crop Yields

Part of the difference in crop yields from farm to farm traces to kind of soil.

Corn yields both for silage and grain averaged highest on the Lansing-Conesus, Ontario-drumlin, Honeoye-Lima, and Cazenovia-Ovid and lowest on the Odessa-Schoharie associations. The extreme difference amounted to 22 bushels of corn for grain and 4.4 tons of corn silage per acre.

Wheat yields were highest on the Cazenovia-Ovid soils and lowest on the Palmyra--a difference of 11 bushels per acre. Hay yields were generally similar on all soils, but were actually highest on the Lansing-Conesus and lowest on the Odessa-Schoharie soils:

Soil assoc- iation*	Yield per acre			
	Corn grain bus.	Corn silage tons	Wheat bus.	Hay tons
HL	72	13.5	42	2.7
Od	69	12.6	41	2.7
OH	58	10.5	38	3.0
LC	70	14.3	41	3.3
CO	73	13.2	47	2.7
P	63	12.1	36	2.8
OS	50	9.9	38	2.4

Plant Food Related to Crop Yields

Many farm practices influence crop yields. One practice that can be analyzed in this study has to do with the amount of plant food supplied from farm-produced manure and commercial fertilizer.

Intensity of stocking. The 20 to 39 cow farms and the 60 to 119 cow farms that were stocked the heaviest with cattle in relation to the cropland had the highest crop yields, evidently because of the additional plant food supplied from manure. In the group of 40 to 59 cow farms, the relationship was irregular, because of variation in the amounts of commercial fertilizer applied. Therefore, an analysis was made in which the amount of plant food from both sources was considered.

Plant food per crop acre. The amount of plant food available from stable manure was calculated for each farm. It was assumed that: a) 9 tons of manure was produced, other than that on pasture, per cow or other animal unit, and b) a ton of manure contained 10 pounds of nitrogen, 5 pounds of phosphoric acid and 10 pounds of potash.

The actual amount of plant food available for the crops depended on how the manure was handled. The common practice on most farms was to spread the manure daily. For the few who did not follow this practice, the calculation overstates the actual situation.

On the 20 to 39 cow farms, for example, the amount of stable manure produced was 420 tons per farm. This was equal to 3.2 tons of manure, or 80 pounds of plant food, per crop acre.

Practically all of the dairymen used some commercial fertilizer on their 1963 crops. On the 20 to 39 cow farms, the application amounted to the equivalent of nearly 200 pounds of 10-10-10 mixed fertilizer, or 36 pounds of plant food,

per crop acre. Plant food from the 2 sources amounted to 139 pounds per crop acre in the group of 20 to 39 cow farms. The amount was even larger on large-size farms:

	20-39 cow farms	40-59 cow farms	60-119 cow farms
Source			
	Pounds of plant food		
Manure	80	84	81
Comm. fert.	<u>59</u>	<u>68</u>	<u>76</u>
Total	139	152	157

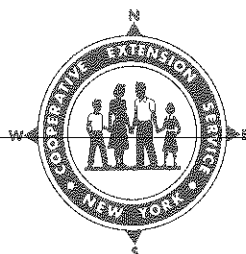
The farms were sorted by the amount of plant food per crop acre from both manure and commercial fertilizer and the crop yield index was tabulated. The larger the amount of nutrients the higher the crop yields, on the average. In each size of herd group, the relationship was fairly consistent although not particularly strong. That is to say, differences in levels of plant food explained only part of the variability in crop yields:

	20-39 cow farms	40-59 cow farms	60-119 cow farms
Pounds of plant food per crop acre			
	Crop yield index		
Less than 125	91	98	102
125 to 149	97	102	106
150 to 174	98	104	116
175 or more	116	107	119

In summary, above-average crop yields were profitable. They were linked directly to milk production per cow through the feed supply and to crop sales. Average yields per acre of the top 10 percent of the farms in major crops were: hay 4.5 tons, corn silage 20 tons, and wheat 56 bushels.

Yours truly,

L. C. Cunningham
L. C. Cunningham
Extension Economist



New York State Cooperative Extension Service

Department of Agricultural Economics
Letter Number 9

Cornell University, Ithaca, New York
July 30, 1965 27

DAIRY FARMING IN THE CENTRAL PLAIN REGION

Rate of Milk Production per Cow

To Farmers Visited on
Farm Management Survey:

The average amount of milk sold per cow in the Central Plain region is some 20 percent above the state average, but the variability from herd to herd is remarkably wide (letter number 3). Some dairymen have worked for and obtained high levels of milk production per cow while others have settled for lower production. How well have those efforts been rewarded?

Income relationships will be discussed after showing how the amount of milk sold per cow is related to the use of labor and machinery, and to miscellaneous dairy expenses. The tendency for crop yields and the amount of milk per cow to be linked together was noted in the previous letter.

Relation to use of labor. As the amount of milk sold per cow increased, the number of cows cared for per man showed little change in the groups of farms with 20 to 39 and 40 to 59 cows. In the group with 60 to 119 cows, however, the number did decrease some:

Pounds of milk sold per cow	20-39 cow farms	40-59 cow farms	60-119 cow farms
	Cows per man		
Below 8,500	18	21	29
8,500-10,499	18	23	28
10,500-12,499	19	21	25
12,500 plus	17	20	25

Relation to machinery expenses. Power and machinery expenses per cow did rise markedly as the amount of milk per cow increased. For example, in the group of farms with 40 to 59 cows, these expenses averaged only about \$150 per cow in the subgroup of farms with low milk production. But on farms with high production, they amounted to \$200 per cow:

Pounds of milk sold per cow	20-39 cow farms	40-59 cow farms	60-119 cow farms
	P. & M. expenses per cow		
Below 8,500	\$166	\$147	\$164
8,500-10,499	181	150	147
10,500-12,499	186	183	172
12,500 plus	206	200	174

Only one subgroup average was notably out of line--that for the group of farms with 60 to 119 cows and less than 8,500 pounds of milk sold per cow. There were only 8 farms in this subgroup.

Since milk hauling is a large item in these expenses, an increase in them would be expected as the amount of milk sold per cow went up. But more than milk hauling is involved. Additional feed was handled and more equipment was used on the farms with high-producing herds than on those with low-producing ones.

Relation to miscellaneous expenses. Miscellaneous dairy expenses, including

supplies, milk testing, breeding fees, and veterinary and medicines, averaged at least twice as much per cow on farms with high-producing cows as on those with low producers:

Pounds of milk sold per cow	20-39 cow farms	40-59 cow farms	60-119 cow farms
	Misc. expenses per cow		
Below 8,500	\$14	\$11	\$11
8,500-10,499	16	17	15
10,500-12,499	21	21	21
12,500 plus	28	27	26

Thus, aside from feed expenses which will be analyzed later, increasing the amount of milk per cow involved nearly the same number of cows per man, but rising expenses per cow for power and machinery and other items incidental to the care and management of cows.

Relation to income. Whether herd size was small, average or large, incomes depended heavily on the level of milk production per cow. Small herds of low-producing cows failed to make a plus labor income, but small herds of high-producing cows made an average labor income of \$4,200. Within this subgroup, one farm out of 3 made at least \$5,000.

In a similar way but even more pronounced in the group of farms with 40 to 59 cow farms, low production resulted in an average loss of \$800. In contrast, those farms with high production earned nearly \$7,000. Two out of 3 of these farms made at least \$5,000. Average incomes of the 2 intermediate groups were in between these extremes.

It is in the group of large farms (60 to 119 cows) that the most striking relationship was found. Low production resulted in large losses. The average labor income was minus \$1,940 for the subgroup of farms that sold less than 8,500 pounds of milk per cow. Fortunately, there were relatively few farms in this situation of having a large herd of low-producing cows--one farm with low-

producing cows for every 3 farms with high-producing cows. The group of large farms that sold 12,500 pounds of more of milk per cow made an average labor income of \$10,000:

Pounds of milk sold per cow	20-39 cow farms	40-59 cow farms	60-119 cow farms
	Labor income		
Below 8,500	\$ -120	\$ -820	\$-1,940
8,500-10,499	1,340	2,380	4,670
10,500-12,499	2,810	3,920	7,140
12,500 plus	4,220	6,930	10,040

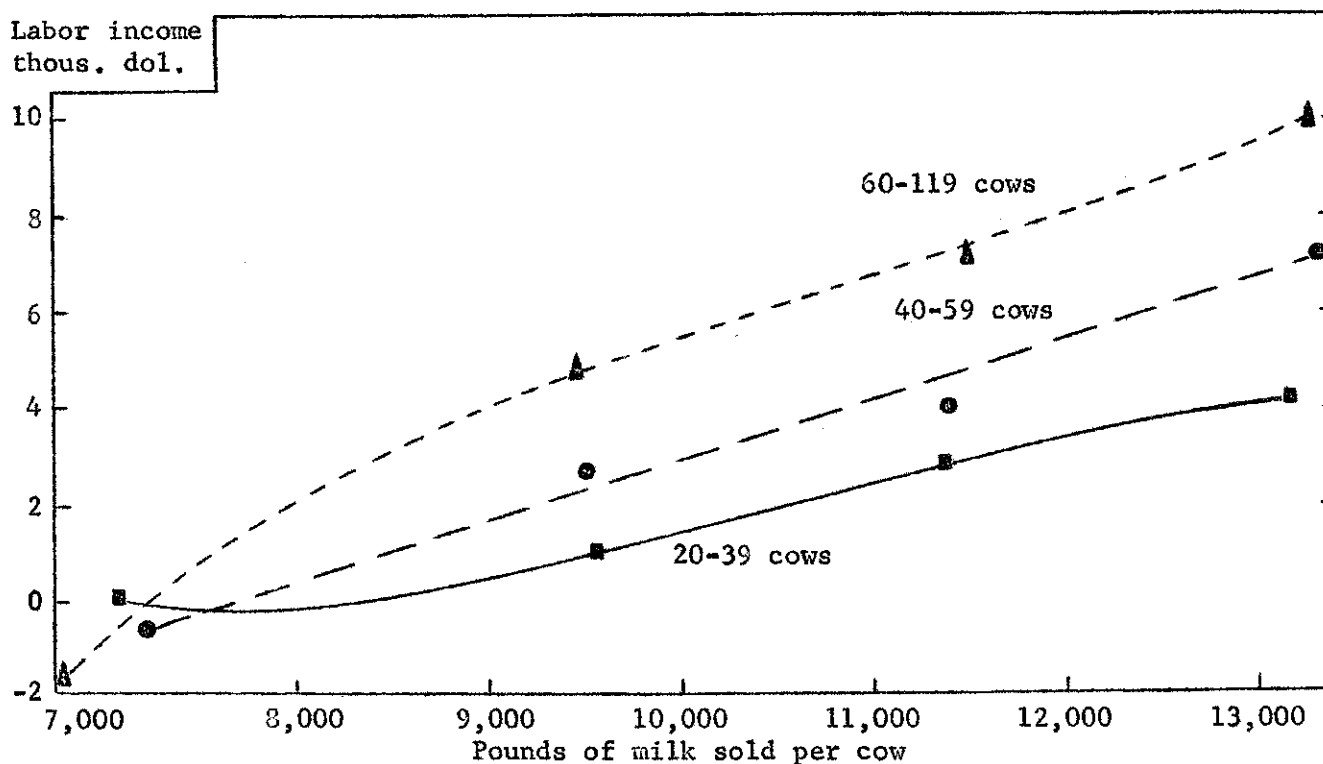
Among the farms with large herds of high-producing cows, only one farm out of 25 incurred a loss, while 4 out of 5 made at least \$5,000. High-producing cows are good income insurance.

The milk per cow-labor income relationship is shown graphically on the following page. The horizontal scale across the bottom of the chart is the pounds of milk sold per cow and the vertical scale on the left relates to labor income. The 3 lines in the chart show changes in labor income as milk per cow increases for each of the 3 size of herd groups of farms.

As the pounds of milk sold per cow increased, labor incomes rose fairly consistently and by significant amounts in all 3 size of herd groups. As we have seen, the larger the herd, the higher the level of incomes. But, also, the larger the herd the stronger the impact of milk sales per cow on income.

The addition of 1,000 pounds of milk sold per cow raised labor income, on the average, in the 3 size of herd groups of farms by these amounts:

Number of cows per farm	Increase in labor income
20 to 39	\$ 730
40 to 59	\$1,260
60 to 119	\$1,790



What is meant by 'low' and 'high' when referring to the amount of milk sold per cow? In these sorts of the dairy farms in this region of the state, the 'low production' groups of farms of each size group sold, on the average, around 7,000 pounds of milk per cow.

The 'high production' groups averaged just above 13,000 pounds of milk sold per cow:

Pounds of milk sold per cow	20-39 cow farms	40-59 cow farms	60-119 cow farms
Avg. lbs. milk per cow			
Below 8,500	7,090	7,220	6,840
8,500-10,499	9,570	9,510	9,500
10,500-12,499	11,400	11,400	11,470
12,500 plus	13,190	13,310	13,260

pound figure represented about the optimum economic level of milk sales per cow for the current period.

Changes in cost-price relationships and the adoption of new technology have affected this level in the past and will continue to do so in the future. For those dairymen who are seeking a goal in their operations, the 13,000-pound figure is a reasonable one.

Practices Related to Milk per Cow

A few practices involved in improving milk production per cow can be analyzed statistically in this study. Analysis was made of season of milk production, percentage of cows removed, and amounts of roughage and feed purchases per cow.

In the entire sample of 404 farms in this study, only 3 farms sold more than 15,000 pounds of milk per cow and in addition to these 3 only 7 farms sold more than 14,000 pounds per cow. It is concluded from this study of the experiences of dairymen that the 13,000-

Season of milk production. The higher the percentage of milk sold during October to March, the higher the average amount of milk sold per cow in all 3 size of herd groups of farms. The increases were consistent, except in one instance, but they were not large:

Percent of milk sold Oct.-Mar.	20-39 cow farms	40-59 cow farms	60-119 cow farms
	Lbs. milk sold per cow		
Less than 45	8,480	9,170	8,490
45 to 49	10,020	10,510	10,340
50 to 54	11,030	10,720	11,610
55 or more	10,330	11,570	11,870

Increases in the amount of milk sold per man and in the yearly average price received for milk were also associated with an increasing percentage of milk sold in the October to March period. As a consequence, average labor incomes were generally higher in the groups of farms with emphasis on 'year round' milk production than on those with emphasis on 'summer' production. The optimum pattern was about 55 percent of the year's milk produced in the 6 months October to March.

Percentage of cows removed. The number of cows removed from a herd by culling, death or other reason was divided by the number of cows in the herd at the beginning of the year to obtain the percentage of cows removed.

The percentage of cows removed showed only a nominal relationship, on the average, to the amount of milk sold per cow. Apparently, increased culling did little more than maintain the level of milk production per cow. In all 3 size of herd groups, the farms with 0 to 15 percent of the cows removed had the lowest average production. Higher rates of removal, however, were not closely related to milk per cow:

Percent of cows removed	20-39 cow farms	40-59 cow farms	60-119 cow farms
	Lbs. milk sold per cow		
0 to 15	9,450	9,590	10,320
16 to 24	10,380	10,650	10,610
25 to 33	10,700	11,270	11,420
34 or more	10,050	10,990	11,500

As would be expected, the percentage of cows removed had a direct impact on the amount of depreciation or loss on cows. At the lowest rate of removal, 0 to 15 percent, the loss on cows averaged only \$10 per cow in the herd (not per cow removed). But at the highest rate, 34 percent or more, the loss amounted to approximately \$50. For example, with a 50-cow herd, the loss from cows removed on such a farm would amount to \$2,500.

Obviously, some cows must be discarded from a herd almost every year, but adoption of practices that make it possible to hold the removal rate to not more than 20 percent is a practical target.

Amounts of roughage and purchased feed. As suggested by the discussion of crop yields in letter number 8, the amount of roughage in terms of hay equivalent harvested per cow was related to the amount of milk sold per cow. This relationship was, of course, also influenced by the amount of feed purchased per cow. What combinations of home-produced roughage and purchased feed gave the best results?

To probe this question, the 3 size of herd group of records were put together. The records were sorted into 3 groups according to the amount of hay equivalent harvested per cow and each of these groups was sorted by the amount of feed purchased per cow into 4 subgroups. The amount of milk sold per cow, other factors and labor incomes were tabulated.

At each level of purchased feed per cow, the larger the amount of hay equivalent harvested per cow the higher the average amount of milk sold per cow. The differences between groups were moderate, however, and in fact at the highest levels of purchased feed and roughage per cow, the amount of milk per cow failed to increase.

Looking at the figures the other way round, at each level of roughage per cow the larger the feed purchases per cow the higher the amount of milk sold per cow. Again, the increases from group to group were moderate.

The group of farms with a low amount of roughage and small purchases of feed per cow had the lowest average amount of milk sold per cow--8,780 pounds:

Purchased feed per cow	Tons H.E. harv. per cow		
	Less than 6.0	6.0 to 7.9	8.0 or more
	Lbs. milk per cow		
Less than \$40	8,780	10,360	10,800
40 to 79	9,300	10,420	11,250
80 to 119	10,580	11,030	11,310
120 or more	11,220	11,860	11,780

The groups of farms with 6.0 to 7.9 and 8.0 or more tons of roughage and \$120 or more of purchased feed per cow had the highest average milk output--about 11,300 pounds per cow.

Profits did not follow the pattern of milk sales per cow. Consider the group of farms with less than 6.0 tons of hay equivalent per cow. As feed purchases per cow rose, average labor incomes fluctuated irregularly, indicating uncertainty as to the profitability of buying additional feed under those circumstances:

Purchased feed per cow	Tons H.E. harv. per cow		
	Less than 6.0	6.0 to 7.9	8.0 or more
	Labor income		
Less than \$40	\$2,840	\$5,460	\$4,960
40 to 79	2,600	4,320	4,830
80 to 119	3,560	4,150	4,520
120 or more	1,720	2,830	4,480

Next look at the groups of farms with 6.0 to 7.9 and 8.0 or more tons of roughage per cow. In both groups, as feed purchases per cow went up average labor incomes decreased slightly. The response in milk per cow was not strong

enough to make increased purchases of feed profitable.

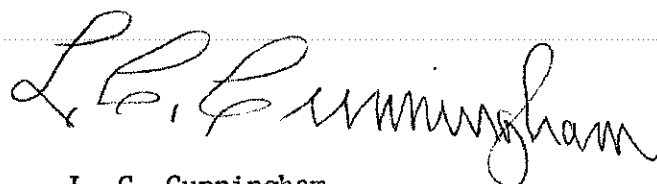
The combination of feed sources that was least profitable in terms of average labor income was the group of farms with low roughage supplies (less than 6.0 tons of hay equivalent per cow) and high feed purchases (\$120 or more per cow).

The combination of feed sources that produced the highest average labor income by a small margin, though not the highest average amount of milk sold per cow, was that of 6.0 to 7.9 tons of hay equivalent and less than \$40 of purchased feed per cow.

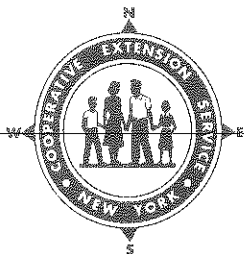
Generally speaking, feeding rates of both roughages and concentrates on the dairy farms in this region were relatively plentiful. Differences in feeding levels accounted for only a part of the variation from farm to farm in the amount of milk sold per cow.

In summary, differences in the amount of milk sold per cow explain much of the variation in labor incomes within size of herd groups of farms. That is, the efforts made to improve milk production per cow were well rewarded. A herd average of 13,000 pounds of milk sold per cow appeared to be an economic optimum level of production.

Yours truly,



L. C. Cunningham
Extension Economist



New York State Cooperative Extension Service

Department of Agricultural Economics
Letter Number 10

Cornell University, Ithaca, New York
September 14, 1965 32

DAIRY FARMING IN THE CENTRAL PLAIN REGION

Labor Efficiency

To Farmers Visited on
Farm Management Survey:

The relation of labor efficiency to income in the Central Plain region is reported in this letter.

Several measures of the use of labor were calculated for the farms in this study. Here are the averages for the major ones:

Measure	Average
Cows per man	18
Crop acres per man	76
Work units per man	273
Milk sold per man(thous.lbs.)	191
Product units per man	36

Product Units per Man

Product units per man is the measure selected to use in the analysis. A product unit is equal to the amount of milk sold from one average cow (8,540 pounds in this period), and represents 90 hours of labor. All other products from the farm are converted to product units. The total product units of a farm are divided by the man equivalent to obtain the volume of output per man.

Size of Herd and Use of Labor

Having a moderately large business is the most important way to make possible high labor efficiency. There was a close relationship between size of herd and average product units per man.

In the group of farms with 20 to 39 cows, the average number of product

units per man was 34. But in the group with 60 to 99 cows, the output was 53. In the largest herds, it was even higher:

Cows per farm	Product units per man
6 to 19	21
20 to 39	34
40 to 59	43
60 to 99	53
100 or more	58

What about differences in labor efficiency on farms with similar size of herds? For study of this variation, 3 size-of-herd groups were used: 1) 118 farms with 20 to 39 cows, 2) 148 farms with 40 to 59 cows, and 3) 95 farms with 60 to 119 cows.

Use of Labor and Size of Labor Force

Within each of the 3 size-of-herd groups of farms, high labor efficiency is essentially a matter of running a given size of business with a minimum amount of labor.

On the 40 to 59 cow farms, for example, the subgroup of farms with 55 or more product units per man (average 63) was run with a labor force that averaged 1.7 men, as compared with 2.9 men for the subgroup of farms with less than 35 product units per man (average 29). The number of cows per farm averaged the same in both subgroups. Part of the labor force was replaced by machines (see table).

Product units per man		Crop acres per man	Cows per man	Thous.lbs. milk sold per man	Man equiv. per farm	P. & M. expenses per man	Labor income
Range	Average						
20-39 cow farms							
Less than 25	20	47	13	105	2.3	\$2,080	\$ -650
25 to 34	30	68	16	158	1.9	2,920	1,330
35 to 44	39	91	20	210	1.5	3,520	2,500
45 or more	53	110	24	275	1.4	4,340	5,420
40-59 cow farms							
Less than 35	29	65	17	150	2.9	\$2,580	\$ -160
35 to 44	39	88	20	209	2.5	3,240	3,710
45 to 54	49	100	23	261	2.2	4,120	4,750
55 or more	63	124	29	334	1.7	4,680	7,110
60-119 cow farms							
Less than 45	37	77	21	199	3.9	\$3,020	\$1,780
45 to 54	48	95	23	253	3.6	3,610	6,310
55 to 64	59	121	28	305	3.0	4,340	9,340
65 or more	73	132	33	390	2.7	5,420	9,860

Use of Labor and Machinery Expenses

The cost of this substitution can be illustrated by this same group of 40 to 59 cow farms. The subgroup of farms with 55 or more product units per farm had power and machinery expenses per man of \$4,680 per man, compared to only \$2,580 per man for the subgroup of farms with less than 35 product units per man.

A similar substitution of machines for labor with accompanying costs was found in the other 2 size-of-herd groups of farms.

In the group of farms with 20 to 39 cows the low labor efficiency farms (less than 25 product units per man) spent only \$2,080 per man for power and machinery operations, but the high labor efficiency group (45 or more product units per man) had \$4,340 per man of such expenses. Likewise, in the group of farms with 60 to 119 cows, those farms with low labor efficiency spent only \$3,020 per man, compared to \$5,420 per man for those farms with high labor efficiency. Did such substitution pay?

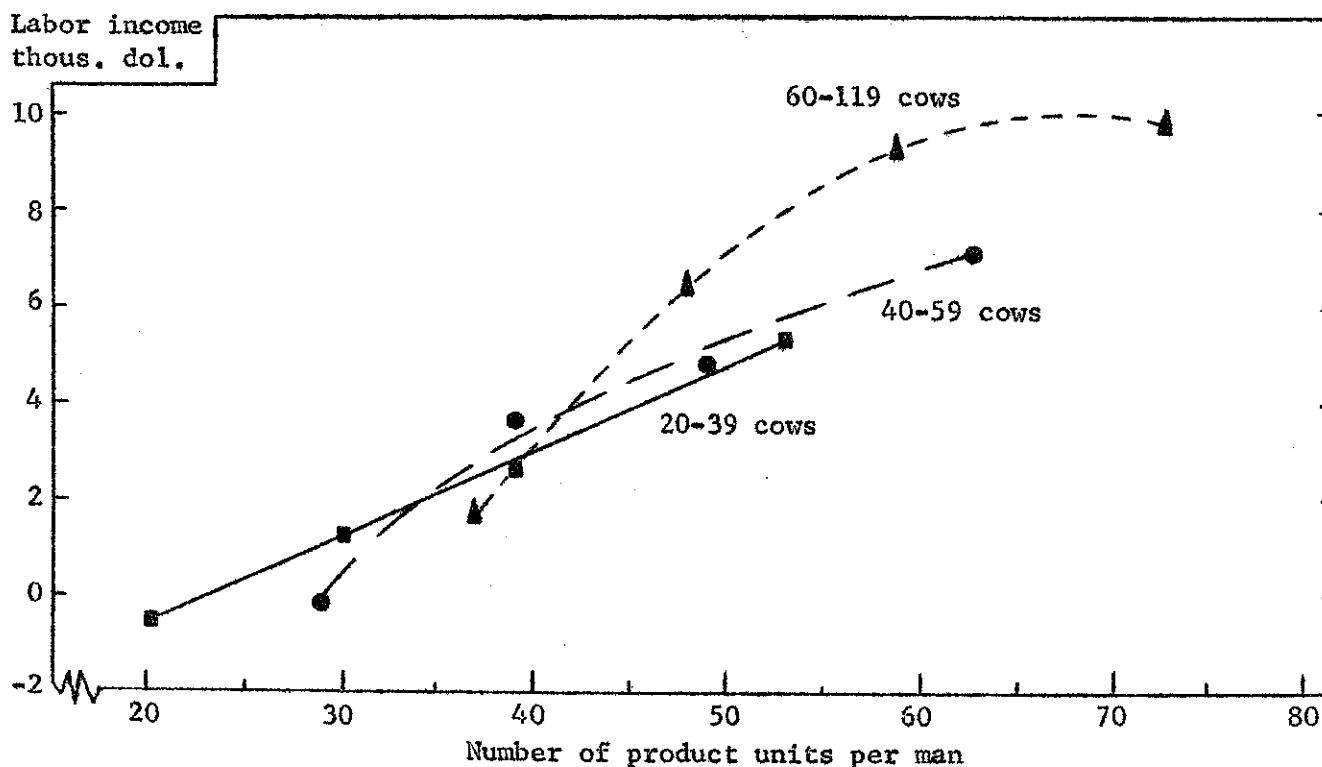
Use of Labor and Income

In all 3 size-of-herd groups, as the number of product units per man increased average labor income went up strikingly.

On farms with 20 to 39 cows, low labor efficiency resulted in a loss on the average of \$650; high labor efficiency resulted in a labor income of about \$5,400.

Similarly on farms with 40 to 59 cows, relatively low labor efficiency operations failed to make a plus labor income, but those making full use of labor made \$7,100.

Volume of output per man was on a higher level generally on the large farms (60 to 119 cows) than on the farms in the other 2 groups. Among these large farms, those that made the fullest use of labor (65 or more product units per man) had an average labor income of nearly \$9,900, compared with only about \$1,800 for those with less efficient labor use (less than 45 product units per man).



The relation of product units per man to labor income for each of the 3 size-of-herd groups is shown graphically in the accompanying chart.

The direct effect of volume of output per man on income is indicated by the upward sweep of the lines in the chart. Low output limited income in all 3 size-of-herd groups. High output resulted in much improved income, especially in the group of largest herds (60 to 119 cows).

Milk sales per cow and crop yields were higher on high labor efficiency farms than on low efficiency farms. These two factors contributed to the increased output per man and also accounted for part of the higher labor incomes.

Type of Housing and Use of Labor

Among the many things in addition to size of business that influence labor efficiency, type of housing used for dairy cattle was analyzed in this study.

Generally speaking, volume of output per man was higher on farms having loose housing arrangements than on farms with conventional stall barns.

Among the farms with 40 to 59 cows, 128 had stall barns and 13 had loose housing. The average size of labor force was similar in the two subgroups of farms, but product units per man of 48 on farms with loose housing were 6 units higher than on farms with stall barns. On 60 to 99 cow farms, the difference in output per man for loose housing over stall barns was even greater (13 units).

Among the farms with 100 or more cows, the numbers of observations are small--14 farms with stall barns and 8 farms with loose housing. Size of herd was about the same in both groups, but on the average almost 2 more men were employed on farms with stall barns than on those with loose housing. Part of this larger labor force on the farms with stall barns is related to the fact that crop sales per farm were more than

Type of housing	Number of farms	Cows per farm	Man equiv. per farm	Product units per man	P. & M. expenses per man	Lbs. milk sold per cow	Labor income
40-59 cow farms							
Stall barn	128	47	2.4	42	\$3,330	10,610	\$3,420
Loose housing	13	50	2.2	48	3,910	11,370	4,660
60-99 cow farms							
Stall barns	49	71	3.1	49	\$3,800	10,830	\$5,750
Loose housing	18	81	3.1	62	4,180	11,820	7,050
100 or more cow farms							
Stall barns	14	136	5.9	49	\$3,360	10,100	\$7,980
Loose housing	8	134	4.0	71	5,190	11,080	9,130

double those on farms with loose housing. Even so, the number of product units per man averaged 71 on the farms with loose housing, compared to only 49 on the farms with stall barns.

In all 3 size-of-herd groups, power and machinery expenses per man were higher on farms with loose housing than on those with stall barns. This was especially so for the group of farms with 100 or more cows, because the number of men was relatively small on farms with loose housing.

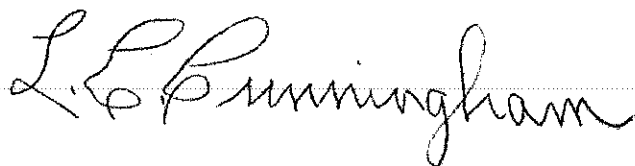
It is an interesting fact that the amount of milk sold per cow averaged about 1,000 pounds per cow higher on farms with loose housing than on farms with stall barns in all 3 size-of-herd groups.

Principally because of higher labor efficiency, and in part because of somewhat higher milk sales per cow, the loose housing farms had an advantage in average labor income of about \$1,200 over the stall barn farms in each size-of-herd group.

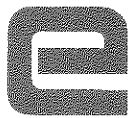
In summary, high labor efficiency is in large part a matter of large size of business. But within size limits, some dairymen obtained much larger output per man than others did by getting the same amount of work done with a smaller labor force, a larger amount of mechanization and use of loose housing for cattle.

A reasonable goal of labor accomplishment for dairymen in this region is about 60 product units per man, equivalent to 125 acres of crops, 30 cows and 325,000 pounds of milk sold per man.

Yours truly,



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Letter Number 11

February 8, 1966

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DAIRY FARMING IN THE CENTRAL PLAIN REGION

Changes in Farming

To Farmers Visited on Farm Management Survey:

This is the eleventh and final letter in the series to report findings of the study of commercial dairy farms in the Central Plain region. It summarizes the changes that occurred from 1954 to 1964 in the region.

Fewer Farms

As elsewhere in farming, production in the region is being concentrated on fewer but larger farms. Counts made of commercial dairy farms in the 150 sample road segments showed that there were about two-thirds as many such farms in 1964 as 10 years earlier.

Changes in Factor Averages

Labor force unchanged. In contrast to other phases of the farm business, the average size of the labor force was about the same in both periods--the equivalent of 2 full-time workers.

Also, the make-up of the labor force was unchanged--operator one-half, family labor one-fourth and hired labor one-fourth of the total. Only in the group of farms with 100 or more cows did the amount of hired labor exceed on the average that of operator and family labor.

Output per man rose. Although the average size of the labor force per farm remained about the same, output per man rose sharply. During the decade, crop acres per man increased from 65 to 82, milk cows per man from 12 to 19 and the

amount of milk sold per man from 93,000 pounds to 191,000 pounds. Fewer crops were raised for sale but overall output per man rose about 50 percent.

Shift to more roughage crops. The use of cropland was shifted to larger amounts of roughage crops--hay and corn for silage--and smaller amounts of vegetable and grain crops for sale.

Herds increased in size. The number of farms with fewer than 20 cows dropped sharply, while the number with 40 to 59 cows increased markedly. Also, farms with 60 or more cows gained in importance. The average number of cows per farm rose from 22 to 37 during the 10-year period.

Milk per cow went up. In 1953-54, 48 percent of the farms had milk sales of less than 8,000 pounds per cow. By 1963-64, the proportion had dropped to only 14 percent. Similarly, in the earlier period, only 3 percent of the farms had milk sales of 11,000 pounds or more per cow, but in the later period 43 percent of the farms attained this production level.

Milk sales averaged 10,240 pounds per cow in 1963-64 compared with 8,050 pounds 10 years earlier.

More mechanization. In 1963-64, most of the farms had hay balers and more than half had field choppers. Hay conditioners were quite common on all except the

smallest farms. Such things as silo unloaders and mechanical gutter cleaners were in use on two-thirds or more of the larger farms. Bulk milk tanks were found on about half of the typical-size farms and on four-fifths of the large farms.

No physical measure of all machines is available, but investment and annual expenses are indicators of change. In the 10-year period the average investment in power and machinery per farm, using current depreciated values, jumped from \$9,250 to \$15,690, or 70 percent. Annual expenses for power and machinery per farm more than doubled--\$3,080 to \$6,480.

Trend toward loose-housing. In 1963-64, practically all of the herds under 40 cows were housed in conventional stall barns. But nearly a fourth of the herds of 60 or more cows were kept in loose housing systems and another fourth of them were in combinations of stall barns and loose housing arrangements. Most of the new dairy structures are for loose housing systems.

Larger capital investment. Average capital investment per farm during the decade rose from \$41,760 to \$79,150, or nearly doubled. Price rises in land and dairy cattle, increased mechanization and bigger farms and herds largely account for the change.

Labor incomes declined. Economic conditions for farmers generally were less favorable in 1963-64 than 10 years earlier. Lower milk and cash crop prices for dairymen in the Central Plain region added to the price-cost squeeze.

In 1953-54, 13 percent of the farms failed to make a plus labor income. By 1963-64, the proportion had risen to 24 percent. However, the proportion of farms making labor incomes of \$10,000 rose from 4 percent to 6 percent. The average labor income declined from \$3,140 to \$2,550.

Changes in Factor-Income Relationships

Relation of size of business to income unchanged. Although the level of incomes was lower in 1963-64 than 10 years earlier, average labor income increased as number of cows per farm went up in both periods. Within the limits of 20 to 60 cows, one additional cow raised average labor income about \$100 in both 1953-54 and 1963-64.

Relation of crop yields to labor income similar. Raising crop yields had essentially the same influence on average labor income in both periods. Ten percentage points of increase in the crop yield index gave increases in average labor income of \$660 in 1953-54 and \$700 ten years later.

Relation of milk per cow to income stronger. Increasing the amount of milk per cow had a stronger effect on income in 1963-64 than formerly. Within the range of 6,000 to 11,000 pounds of milk sold per cow, a 1,000-pound increase lifted average labor income nearly \$1,500 in 1963-64.

In 1953-54, such an increase in milk per cow boosted labor income only \$600. This smaller impact on income was due in part to relatively good crop sales on farms with low-producing herds. If the effect of crop sales is removed, the increase in labor income would still not exceed \$1,000.

Relation of output per man to labor income weaker. The average labor income response to rising output per man was strong in both periods, but the income advantage was somewhat less in 1963-64 than in the earlier period.

Within the range of 10 to 45 product units per man, an additional unit was associated with an average increase in labor income of \$266 in 1953-54 compared with \$236 in 1963-64. High expenses for power and machinery in the later period

limited the response in labor income. At the level of 40 to 44 product units per man, such expenses averaged \$1,000 per man higher than 10 years earlier.

Future of Dairying in the Region

Dairy farming in the Central Plain region is in a strong competitive position relative to other livestock enterprises within the region and to dairying in other regions of the state.

As a result of all the changes described, total milk production in the region increased by about 40 percent from 1954 to 1964. The increase for the state as a whole was 22 percent. In other terms, this region accounted for 11.4 percent of the New York State's total in 1964 compared with 9.9 percent in 1954. This trend in milk production is expected to continue upward and at a faster pace than that for the whole state.

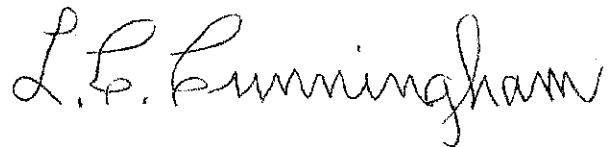
The Central Plain region is one of generally favorable resources, but your success depends on how you operate your farm. Progress takes some doing.

Benchmarks and Guidelines

This systematic study of the experiences of groups of dairymen in the operation of their farms has provided useful benchmarks or standards by which to judge individual farms and reliable guidelines for farming in the future. We hope the findings are helpful to you in knowing your farm and your region.

Thanks again for your cooperation and best wishes for your success in dairy farming.

Yours truly,



L. C. Cunningham
Extension Economist

P. S. Single copies of the series of letters assembled as A. E. Research 192 are available on request.

FARM BUSINESS FACTORS AND INCOMES, BY SIZE OF HERD
404 dairy farms, Central Plain region, New York, 1963-64

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Item	Number of cows per farm					All farms
	6-19	20-39	40-59	60-99	100+	
<u>Size of business</u>						
Man equivalent per farm	1.3	1.8	2.4	3.2	4.9	2.0
Cows per farm	15	30	47	74	135	37
Crop acres per farm	71	131	210	320	492	162
Product units per farm	26	58	97	164	270	75
Work units per farm	214	444	709	1,128	1,912	555
<u>Crops</u>						
Hay per acre, tons	2.2	2.6	2.8	3.2	3.1	2.6
Corn silage per acre, tons	12.0	10.6	12.1	12.2	14.0	11.4
Corn grain per acre, bushels	54	65	70	75	81	65
Oats per acre, bushels	58	66	67	66	75	65
Wheat per acre, bushels	35	40	41	43	45	40
Hay equiv. harv. per cow, tons	5.8	6.5	7.2	8.0	6.9	6.9
Comm. fert. per crop acre, lbs.	47	59	68	77	78	61
Plant food per crop acre, lbs.	113	139	152	159	175	140
<u>Milk</u>						
Milk sold per cow, lbs.	9,157	10,230	10,743	11,140	10,576	10,235
<u>Labor</u>						
Cows per man	11	17	20	23	27	19
Crop acres per man	53	74	88	99	99	76
Milk sold per man, thous. lbs.	109	183	226	280	321	191
Product units per man	21	34	43	53	58	36
<u>Investment (end of year)</u>						
Total capital per farm, thous.	\$ 31	\$ 64	\$ 102	\$ 161	\$ 249	\$ 79
Total capital per cow	\$2,131	\$2,163	\$2,161	\$2,167	\$1,853	\$2,148
Power and machinery per cow	\$ 422	\$ 441	\$ 436	\$ 401	\$ 332	\$ 431
Land and buildings per cow	\$1,363	\$1,297	\$1,269	\$1,316	\$1,061	\$1,296
<u>Farm expenses</u>						
Power and machinery per cow	\$187	\$183	\$173	\$167	\$147	\$179
Crop expenses per crop acre	\$ 8	\$ 10	\$ 12	\$ 14	\$ 14	\$ 10
Feed bought per cow	\$ 78	\$ 76	\$ 78	\$ 86	\$ 96	\$ 78
Feed bought percent of milk sales	21	17	17	18	21	18
Real estate per crop acre	\$ 25	\$ 25	\$ 24	\$ 25	\$ 26	\$ 25
Depreciation on cows per cow	\$ 27	\$ 29	\$ 31	\$ 31	\$ 39	\$ 30
<u>Other factors</u>						
Percent of cows removed	28	26	26	29	33	27
Heifers per 10 cows	4.3	7.0	7.5	6.5	6.7	6.6
Product units on milk, percent	62	62	62	62	64	62
<u>Prices</u>						
Price per 100 pounds of milk	\$4.09	\$4.28	\$4.33	\$4.36	\$4.33	\$4.27
<u>Labor income</u>						
Average	\$ 186	\$1,981	\$3,647	\$6,258	\$9,025	\$2,553
Percent of farms below \$-5,000	0	4	4	4	0	3
Percent of farms \$+10,000 or more	0	2	8	26	38	6